

## AST 390 Special Topics in Astrophysics and Cosmology: Exoplanets

**Meeting times:** Tuesday / Thursday, 1:00-2:20PM, Frey Hall 217

**Instructor:** Phil Armitage, ESS 440, [philip.armitage@stonybrook.edu](mailto:philip.armitage@stonybrook.edu)

**Office hours:** 2:30-4:00PM Tuesday / Thursday. You are welcome, however, to stop by my office at any time to discuss the class, with or without an appointment. I'm usually in Stony Brook from Tuesday – Thursday.

**Overview:** 25 years ago, in 1995, Michel Mayor and Didier Queloz announced the discovery of *51 Peg b*, the first planet beyond the Solar System to be discovered around a normal star. The discovery marked the start of a new field of astrophysics, *exoplanets*, and led to Mayor and Queloz sharing last year's Nobel Prize in Physics. Science questions addressed by exoplanet research include: (1) determination of the frequency and typical architecture of planetary systems, (2) understanding whether the Solar System is a typical planetary system, (3) testing theories of planet formation and planetary system evolution, (4) observing and modeling planetary atmospheres, (5) identifying potentially habitable planets and searching for atmospheric biomarkers.

The goals for the class are:

- To provide a broad overview of a rapidly developing field of astrophysics, that covers the key science questions raised by current and planned research.
- To provide experience in reading and synthesizing relevant literature.
- To gain experience with computational tools needed to model exoplanet systems.

**Textbooks:** *No textbook is required for the class.* I will post links and pdf copies of relevant reviews, papers, and book chapters on Blackboard. If you feel that you need a book, *Exoplanets* by Sara Seager is an inexpensive option (\$35 on Amazon). It's recommended but by now not very up-to-date.

**Assessment:** Final grades will be based on:

- Homeworks (50%) – approximately every other week. Your lowest score will be dropped.
- A midterm report (20%), due Thursday 12<sup>th</sup> March. This will be a scientific report, about 2000 words in length, that reviews the current state of knowledge in a field relevant to the course. Suggested topics will be posted on Blackboard, but you are welcome to choose alternate relevant topics.
- A final project (30%), due Thursday 7<sup>th</sup> May. This will be a computational project, using publicly available code, that studies a problem in exoplanet dynamics. You may work on the project either individually or in pairs. If you work with a partner, the *write-up* must be solely your own work.

**Slack:** The class has a Slack channel, which you can use to post relevant scientific or news articles of interest to the class, to ask questions about lectures or homework assignments, and message me or your classmates. Use of Slack is *completely optional*.

**General policies:** We will be following the standard University policies summarized below. If you run into problems - whether they be difficulties keeping up academically, pressure of work from

other classes, or personal or medical difficulties – I encourage you to inform me and / or to seek support from the department and from the university. It is almost always easier to address problems during the semester rather than after final grades have been posted.

### **Student Accessibility Support Center Statement**

If you have a physical, psychological, medical or learning disability that may impact your course work, please contact Student Accessibility Support Center, ECC (Educational Communications Center) Building, Room 128, (631)632-6748. They will determine with you what accommodations, if any, are necessary and appropriate. All information and documentation is confidential.

Students who require assistance during emergency evacuation are encouraged to discuss their needs with their professors and Student Accessibility Support Center. For procedures and information go to the following website:

<http://www.stonybrook.edu/ehs/fire/disabilities>.

### **Academic Integrity Statement**

Each student must pursue his or her academic goals honestly and be personally accountable for all submitted work. Representing another person's work as your own is always wrong. Faculty is required to report any suspected instances of academic dishonesty to the Academic Judiciary. Faculty in the Health Sciences Center (School of Health Technology & Management, Nursing, Social Welfare, Dental Medicine) and School of Medicine are required to follow their school-specific procedures. For more comprehensive information on academic integrity, including categories of academic dishonesty please refer to the academic judiciary website at:

[http://www.stonybrook.edu/commcms/academic\\_integrity/index.html](http://www.stonybrook.edu/commcms/academic_integrity/index.html)

### **Critical Incident Management**

Stony Brook University expects students to respect the rights, privileges, and property of other people. Faculty are required to report to the Office of University Community Standards any disruptive behavior that interrupts their ability to teach, compromises the safety of the learning environment, or inhibits students' ability to learn. Faculty in the HSC Schools and the School of Medicine are required to follow their school-specific procedures. Further information about most academic matters can be found in the Undergraduate Bulletin, the Undergraduate Class Schedule, and the Faculty-Employee Handbook.